

### Abstract

Systems, including compositions and methods, for purifying and/or labeling proteins or other molecules of interest and/or for assaying the conformational and/or binding states of such molecules. The compositions may include products having the

5 formula

T-P-M-L

where T is a species, M is a metal ion, P is a peptide or protein that binds the metal ion, and L is a luminescent label. The methods may include purifying and/or labeling a molecule of interest, detecting luminescence energy transfer, detecting dissociation  
10 and/or association of a molecule or molecules of interest, detecting a conformational change in a molecule of interest, and detecting an analyte, among others.